The Ventilation, Heating, and Management of Churches and Public Buildings. By J. W. Thomas. Pp. vi+140. (London: Longmans and Co., 1903.) Price 2*s.* 6*d.*

THIS book is addressed chiefly to the architects, managers and caretakers of buildings, and its opening chapter deals with the physical principles bearing on ventilation. An interesting account is given of the author's observations on alternating air currents and their effects. Some passages are, however, very obscure, as, for instance, when one reads of "the electrical conditions due to the sudden expansion of the air."

In discussing the effects of wind on ventilation, in the second chapter, the writer makes the cryptic statement that "the friction caused by the wind passing over buildings is so great that it is scarcely possible to demonstrate it accurately," and later on he speaks of the air in a room as being strained "to its utmost limit of tension." The next chapter is on the effects of moist air on ventilation, and here the author reaches a climax. In it we read of "rooms where persons are gathered who evolve sputae or other germs of infectious disease," and we are told that "when air is supersaturated with moisture it become heavier." It is a great pity that any writer should have so little sense of the responsibility of authorship as these extracts indicate.

The next chapter, dealing with air inlets and outlets, is disfigured by an obscure passage about carbonic acid being "held in suspension in a semi-dissolved condition" in air saturated with moisture. The actual state of the ventilation in typical buildings, and the methods to be employed in order to improve matters, are next treated. These portions will be found interesting and suggestive.

The remainder of the book is occupied by the discussion of different methods of ventilation, the ventilation of new buildings, and instructions for caretakers.

J. H. V.

Practical Exercises in Heat. By E. S. A. Robson, M.Sc. Pp. xii+187. (London: Macmillan and Co., Ltd., 1902.) Price 2*s.* 6*d.*

THIS useful little volume contains a description of one hundred and two experiments in heat, suitable for an ordinary laboratory course. It is divided into fourteen chapters, each of which comprises a set of classified and numbered experiments—an arrangement which should find favour with teachers of practical physics. At the end of each chapter is given a number of additional experimental exercises, mostly selected from examination papers of the London University. The descriptions are clear and concise, and the text is amply illustrated; the more elaborate experimental corrections are avoided, so as to allow the student to obtain a firm grasp of fundamental principles. The student who conscientiously works through this course should gain fairly accurate results, and, what is more important, a good general idea of the methods of experimental research. The first two chapters are devoted to measurements of temperature, and corrections of the mercury thermometer; these are followed by chapters on the expansion of solids and liquids. It may be noted, in passing, that, in experiment 22, p. 36, on the determination of the temperature at which water acquires its maximum density, the mercury placed in the bulb for the purpose of eliminating the expansion of the latter should have a volume equal to one-seventh of the internal volume of the bulb, not, as is stated, one-seventh of the volume of the glass composing the bulb. The expansion of gases, calorimetry, and change of state are treated in subsequent chapters. Chapters are devoted to electrical methods of measuring temperature, conduction, and radiation. The last chapter is occupied by experiments relating to elementary thermodynamics, including the ratio of the specific heats of air and the value of J. It may be remarked that, though a rough determination of J may be effected by allowing lead shot to fall a number of times down a cardboard tube, and observing the rise of temperature produced, yet if mercury is substituted for the shot, as suggested on p. 155, no appreciable rise of temperature will be obtained, owing to the small viscosity of the mercury. In later editions, it is to be hoped that an account of Prof. Callendar's recently devised method of determining J will be described, since this is the only satisfactory determination which has so far been brought within the reach of the student who can spend but a limited time over an experiment.

E. E.

"*The Amateur Photographer*" *Library.* Nos. 25 and 26. *Enlargements: their Production and Finish* (No. 25). By G. Rodwell Smith. Pp. xxiii + 130. Price 1*s.* *Bromide Printing* (No. 26). By Rev. F. C. Lambert, M.A. Pp. xxiii + 74. Price 1*s.* (London: Hazell, Watson and Viney, Ltd., 1902.)

THERE is no doubt that the photographer is well supplied with literature on his subject, and, as a rule, he is not loth to take advantage of this source of information, although he has to look about him for the book containing the particular kind of help he requires. There are, however, so many workers who do bromide contact printing and enlarge their negatives that these two small manuals on these special topics should prove of great service. The authors treat each manipulation separately, and explain them so that the amateur can easily follow the instructions. One excellent feature of both these books is that the illustrations, which are numerous, exhibit various types of under, correct and over-exposured prints or enlargements, prints from suitable and unsuitable negatives for enlarging, untouched and retouched prints, &c., which should aid the beginner in forming an early judgment on his own results. In addition to the actual routine of the manipulations required, many miscellaneous hints are given, such as obtaining a bromide print quickly from a wet negative, converting a bromide print into a line drawing, &c. Altogether, these manuals are well suited to acquaint amateurs with the nature and use of the materials employed in these processes.

Natural Law in Terrestrial Phenomena. By Wm. Digby, C.I.E., F.S.S., &c. Pp. xlv + 370. (London: W. Hutchinson & Co., 1902.) Price 6*s.*

THIS book deals with the theory, revived and amplified by Mr. Hugh Clements, which seeks the cause of all meteorological and of most volcanic phenomena in luni-solar attractions. The evidence which Mr. Digby adduces in support of Mr. Clements's theory is not convincing. In the early chapters, he shows how a number of gales and eruptions, more particularly the recent catastrophes in the West Indies, have occurred at times when the astronomical conditions were favourable to the production of high tides, but the important question of how often either of these two sets of phenomena may have occurred independently of the other is not discussed. The chapters on forecasting will probably attract most attention. Mr. Clements tells us that the earth, moon and sun occupy the same relative positions every 186 years, and that, therefore, identical weather conditions will prevail. Given trustworthy records extending over 186 years, forecasting becomes a mere matter of looking up records for corresponding days. Failing such records, we must compare days on which the astronomical conditions are as nearly alike as possible. In appendix iii., rules are given for allowing for the effect of small differences in the parallax, declination and times of transit of the sun and moon, on the height of the barometer, the

determining factor in the weather at any place. The unfailing agreement shown by these calculations arouses suspicion. On closer examination, we find that the signs of the corrections vary quite arbitrarily, while at least five different methods of correcting for declination occur in the text. Results based on such foundations cannot inspire much confidence, even though a fair agreement between predictions and Greenwich records is claimed. The more obvious method of exhibiting the similarity of meteorological conditions under similar astronomical conditions by comparing the corresponding isobaric charts does not appear to have occurred to Mr. Clements. We commend this method to the attention of those who have leisure to devote to a detailed examination of a mode of dealing with meteorology that recurs from time to time.

Bis an's Ende der Welt! Astronomische Causerien. Third Edition. Pp. 212. By Prof. F. J. Studnička. (Prague: Published by the Author, 1903.)

THIS book, which was dedicated to the celebration of Christian Doppler's hundredth birthday, has reached a third edition. It is written in the form of a conversation among men of various professions meeting socially together every day with the intention of conveying in popular language many astronomical ideas. "To the end of the Universe" is the subject of a dream which one of the members of this convivial party, Carpenter by name and astronomer by profession, had dreamt, and the narrative is his account of this dream to his companions, subject, of course, to many interruptions by one or other of them seeking more information or more detailed explanation.

The author has quite succeeded in his object, and the book will be found to contain an admirable exposition of some of the more general astronomical topics. Being printed in large and Roman type, it should find many readers in this country.

Die radioactiven Stoffe nach dem gegenwärtigen Stande der wissenschaftlichen Erkenntnis. By Karl Hofmann. Pp. 54. (Leipzig: Ambrosius Barth, 1903.) Price 1.60 marks.

THIS book contains a concise account of the discovery and subsequent investigation of the radio-active elements by Becquerel, the Curies, Rutherford and others. It is written mainly from a chemical standpoint, and many of the effects which have been accurately measured, especially by Rutherford, are referred to as though they had been merely observed and not measured. For example, Rutherford has shown that the radio-activity of thorium-X dies away with time according to the formula e^{-kt}, where t is the time and k a constant, but Hofmann merely mentions that the activity dies away. The book contains references to the original papers published before the latter half of 1902, and should prove useful to those wishing to study the subject. H. A. W.

Carnet de Notes d'un Voyageur en France. Par A. C. Poiré. Pp. viii + 169. (London: Macmillan and Co., Ltd., 1903.) Price 1s. 6d.

M. POIRÉ intends this note-book for boys who will in the future be merchants and manufacturers. The provinces and important commercial centres of France are described only from industrial, commercial and agricultural points of view; historical, administrative and geographical details have been omitted as being unnecessary for the particular class of student for whom the book is written.

At the bottom of each page is a vocabulary of difficult or unusual French words. By the time the student has worked through the volume he will not only have much improved his knowledge of French, but have acquired considerable acquaintance with the characteristics of different parts of France.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

Radium Emission.

CONCERNING the recently discovered heat emission from radium, it is perhaps worth noting that it appears to be connected with, and is probably an immediate consequence of, the remarkable observation by Rutherford that radium emits massive positively-charged particles, which are probably atoms, with a velocity comparable to one-tenth of the speed of light (see *Phil. Mag.*, February, 1893).

Because it is easy to reckon that the emission of a million heavy atoms per second, which is a small quantity barely weighable in a moderate time such as a few weeks (being about the twentieth part of a milligramme per century), with a speed equal to one-tenth that of light, would represent an amount of energy equal to one thousand ergs per second; that is to say, would correspond to heat enough to melt a milligramme of ice every hour. And inasmuch as these atoms are not at all of a penetrating kind, but are easily stopped by obstacles, they would most of them be stopped by a small thickness of air, and their energy would be thus chiefly expended in the immediate proximity of the source, which source would thereby tend to be kept warm.

It would appear on this view as if by enclosing a bit of radium in a small chamber formed of massively obstructing non-conducting walls that it could be made quite hot; provided always that the assumed necessary stimulus, or external supply of molecular energy, could get at it uninterruptedly.

If, in the open, the rate of escape of heat were such that on the average it accumulated for one minute before escaping, the temperature of source and ambient air, with an assumed heat-capacity equal to that of one milligramme of water, would amount to one and a half degrees centigrade. OLIVER LODGE.

March 28.

Radio-activity of Ordinary Materials.

IN connection with the article by Mr. Strutt on this subject in NATURE of February 19, and the letter by Prof. J. J. Thomson in the following week, it may be of interest to mention some work along similar lines that has been in progress in the McGill Physical Laboratory since September last.

At the same meeting of the American Physical Society in Washington last December, at which the interesting paper of Dr. MacLennan and Mr. Burton, referred to by Prof. J. J. Thomson, was presented, an account was given by Mr. H. L. Cooke and myself of some results showing that a very penetrating radiation was given off from the walls of buildings and from the surface of the earth itself.

The primary object of this investigation was to see if the natural ionisation of air observed in closed vessels was due, in part at least, to an external radiation which passed through the walls of the vessel. For this purpose the rate of discharge of a gold leaf electroscope in a brass vessel of about 1 litre capacity was observed. When the closed vessel was surrounded by thick screens of lead and iron, the rate of discharge was reduced about 30 per cent. A similar effect was observed when the electroscope was immersed in a deep water tank. No further reduction of the discharge was observed when the electroscope was surrounded with five tons of lead. These results showed conclusively that about 30 per cent. of the ionisation in closed vessels was due to an external radiation of great penetrating power which passed readily through 1 cm. of lead. In a brass electroscope, surrounded by thick screens, the number of ions produced was reduced to as low as five per c.c. per second. In the course of these experiments, Mr. Cooke observed that a layer of brick round the electroscope *increased* the rate of discharge instead of diminishing it, pointing to the conclusion that the brick was itself radio-active. Mr. Cooke has extended these observations, using cylinders of different metals placed inside the electroscope, with results of a similar character to those already recorded by Mr. Strutt in his article.